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ERORA LAETA EDW. (LEPID.)

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It is hardly necessary for me to make any apology for calling attention to such a butterfly as *Erora laeta*, a rarity in all collections, and perhaps the only one found hereabouts, which, as the describer observed in 1869, seems to be tropical in its colouring and quite out of its latitude in the Northern States and Canada. I am greatly indebted to Mr. Albert F. Winn of Montreal, who in a letter dated October 19, 1920, first drew my attention to the insect. In this letter, whilst speaking of the Hairstreaks, he says "Niphon is always associated with young white pines, but *laeta*, a beautiful blue and black species, just simply happens to get caught by someone with a net. Its food plant and life history are absolutely unknown, not the slightest clue existing, so get busy and find out something for us at the same time as you are hunting for orchids and birds."

As will be noticed, this was in October, 1920, and all through the long winter months I had imaginary visions of capturing *laeta* in the following spring, not that I actually had any real hopes of doing so, certainly not of setting up the earliest record (the previous one was May 18) for the capture of the insect in these parts.

However, this was so, as on April 30 I captured a male in a small wood about one quarter of a mile from my house. As will no doubt be remembered, the spring of 1921 was a very early and hot one, the thermometer on the day in question registering 74 degrees at noon. This no doubt was responsible for the unusually early emergence of the insect, thus more than justifying its vernacular name of "The Early Hairstreak." The place of capture was on some rising ground covered with a thick mantle of dead beech leaves on the outskirts of a small wood. As might be supposed, at such an early date I had no net with me, and the insect was taken between my finger and thumb as it crawled over the dead leaves, having apparently not long emerged. Thinking the matter over later on, and looking to the fact that the only trees in the immediate neighborhood of the capture were a cluster of beech and small hemlocks, I came to the conclusion that probably the former would eventually turn out to be the food plant. The larvæ, after having fed up, would no doubt attach themselves to the underside of the leaves and with them drift to the ground in the fall, remaining buried alive under a mantle of snow all winter to emerge the following spring, when the weather conditions became favourable. How many times I visited that little wood during the next few weeks, I am not going to say, but it was all in vain, for I never saw another *laeta*.

However, on May 21, in company with two friends, Mr. Napier Smith, of Magog and Colonel Morrill, of Dufferin Heights, I climbed Mt. Orford in search of a particular fern which it was hoped would be found near the summit, 2,860 feet above sea level. When about half way up, the trail became very ob-

scure, owing to lumbering operations, and as the other two had never climbed the mountain before, they decided to rest a little whilst I endeavoured to get my bearings. It was during this reconnaissance that I came upon a female *laeta* hovering round a beech tree, the lower branches of which could be easily reached by standing on the slopes of a little gully in which the tree stood. Brother Entomologists, imagine my feelings when I tell you that again I had no net (the impedimenta of a bird, orchid, fern and butterfly enthusiast is truly appalling and cannot always be carried, especially on a long climb) and my two friends, who might have been able to render some assistance, were now out of sight. In cases like this a rapid decision has to be arrived at, and I think I made the right one, that of carefully watching instead of trying to capture and perhaps injuring the insect, for I felt sure she was depositing ova. I had not long to wait, for she almost immediately settled on a leaf and deposited an egg. This leaf I secured, and watched her to another, but I realized that it was going to be an almost impossible thing to keep my eye on the exact leaf and on her further movements as well, so I called to my friends to come help. They wondered what all the excitement was about, and took their time in responding to my frantic appeal, thinking I had found the eggs of some bird or other, which, of course, could very well wait their time. When they did arrive, I had lost sight of *laeta* whilst gathering the second leaf she had flown to, but upon which she had unfortunately failed to deposit. We remained round the tree for some time, but to no purpose, for *laeta* never appeared again. However, I had the satisfaction of being the first person to witness *laeta* deposit an egg in the open and amidst her natural surroundings, and of afterwards seeing the resulting larva, besides discovering the food plant, a thing hitherto unknown. Of course, it is just possible there may be other food plants as well.

Both my friends admitted it was the smallest egg they had ever seen. It was situated on the underside of the beech leaf close against the mid-rib and nearly at the base of the leaf. The exact time of laying was 1.15 p.m. The colour was pale green of a bluish tinge, the surface being perfectly smooth to the naked eye, although under the microscope according to Scudder there are raised hoary points about .02 mm in height and .03 mm apart. The micropyle is .1 mm. in diameter, the height of the egg .32 mm. and the diameter .72 mm., according to the same authority. The first apparent change took place at 7 a.m. on the 25th, the inside of the egg becoming transparent with a small, dark substance (the larva) forming through the centre. On the 27th this dark substance was becoming smaller and less distinct. On the 28th at 7 a.m. another decided change had taken place, all the dark substance had entirely disappeared, the whole of the egg appearing a pale straw colour. At 6.30 p.m. on this same day there was no further change, but at 11.30 p.m., when I again examined it, I found the young larva had hatched.

It was covered with small hairs and was about 1 mm. in length, as near as I could judge, the colour being pale straw. Assuming the emergence to have taken place at 9.15 p.m., the egg stage had lasted exactly seven and one third days. On the 29th at 10 a.m., the young larva had fed in five or six places on the leaf during the night, and was doing well, the head being a deeper colour to the rest of the body, being brown. On the following and succeeding days to

June 3 everything was progressing satisfactorily, and I had every hope of rearing this larva, as I was familiar with many of the Thecla family, having reared all the five British species, including the rarest *Thecla pruni*. Fate, however, was against me, in the shape of an invitation to spend the night of June 3 away from home. This I accepted, leaving the little larva apparently quite well with a good supply of fresh food plant. On arrival home the following evening, I was grieved to find the latter nearly black, and the former (which was then from 1.75 to 2 mm. long) quite dead. What happened can only be surmised. The sun's rays (it was a very hot day) probably finding their way through an opening in the trees surrounding the house, and shining directly onto a pane of glass in the window, thus killing the food plant, and the young larva as well, as they were on the window sill. Thus ended my first experience with *Erora laeta*, but I hope it may not be the last. At all events, now that I have made known the food plant, it should not be so difficult for other collectors to fill up the gaps in its life history.

The male was originally described by W. H. Edwards in the Proc. Academy of Nat. Sciences, Philadelphia, 1862, p. 55, from two examples taken near London, Canada West (Ontario) by Mr. Saunders in 1861.

The female was described by the same author the following year in Proc. Entom. Society of Philadelphia, Vol. II, p. 15 (1863), from a specimen taken by Rev. Mr. Provancher near Quebec City, but he did not recognize it as being the same insect of the opposite sex and therefore gave it a new name, *Thecla clothilde*.

Both sexes are beautifully illustrated by figures of upper and under surfaces in Edwards' "Butterflies of North America," Vol I, pl. 47 (plate 1 of Thecla) and described on page 147. The localities cited are Canada, Maine and West Virginia. A note is given on the author's lucky capture of a specimen near his residence at Coalburgh, W. Virginia, in 1868. In Scudder's splendid work on the "Butterflies of the Eastern U. S. and Canada," appropriate verses or lines of poetry are placed at the head of each article, and under *Erora laeta* we read:

"How would, I say, mine eyes be blessed made
By looking on thee in the living day."—Shakespeare Sonnet.

He refers to it as an exceedingly rare butterfly in the East, having been taken on very few occasions, and then only single specimens have been obtained at any one time, though these captures show it to be widely distributed, including St. Joachim, 25 miles from Quebec (Bowles); London, Ontario (Saunders); Catskill Mts., N. Y. (Edwards); Atlantic City, N. J. (Aaron); Coalburgh, W. Va. (Edwards). It remained the rarest of our Hair-streaks till 1883, when Edwards, Papilio III, 8, reported the receipt of a collection of butterflies from Mt. Graham, Arizona, in which, to his surprise and delight, were no less than thirty examples, the geographical range of the species being thus extended over a thousand miles from the home of its nearest known relatives. In New England two localities in Maine are cited, near Paris (Smith) and Orono (Fernald). Scudder then relates the capture by himself on June 30th of a female near Williamstown, Mass., as follows:

"Walking along thinking of the butterflies whose early stages were un-

known, my thoughts turned to the present species, recalling thereby the lines I had already placed in this work, I repeated them aloud almost unconsciously. I not gone half a dozen steps before I came to a damp spot in the road, when *laeta* alighted at my very feet. Although it was the first time I had seen the charming object alive, I instantly recognized it, and in another second my net was over it, and I shouted triumphantly,

"How have, I say, mine eyes been blessed made
By looking on thee in the living day."

It is thus that we have found and made our acquaintance with *laeta*. None of us have ever gone out with the express intention of looking for it. As related in "The Canadian Entomologist," Vol. XXIII, 1891, p. 96, Mr. A. F. Winn spent May 24, 1888 at St. Hilaire, Que., and after climbing to the bald rock on the top of Beloeit Mountain (1,500 ft.) he had only gone a few yards down the path when a butterfly flew past, settled, and was easily caught, a female *laeta*. On several subsequent visits to St. Hilaire, on or about Victoria Day, May 24th, Mr. Winn informs me a solitary example has been stumbled upon by one or other of our members, always, he thinks, along paths through the woods. Respecting other localities in Canada, the late Rev. Dr. Fyles (An. Rept. Entom. Soc. of Ont., 1896, p. 12) mentions a specimen taken at Sherbrooke, Que., by the Rev. Abbé Bégin on May 25, 1895. Mr. C. H. Young records the capture of two specimens at Meech Lake, Que., on May 18 (An. Rept. Ent. Soc. Ont. 1903, p. 91), also two on June 14 and 15, 1907 (An. Rept. Ent. Soc. Ont., 1907, p. 119). An example from Digby, N. S., is reported by Mr. Russell (An. Rept. Ent. Soc. Ont., 1906, p. 92) taken June 7. On May 18, 1921, Miss Muir captured a female at 16 Island Lake, Argenteuil Co., Que., in the Laurentian Mts., and the following day, her friend, Miss Metayer, took another female. Both these examples were fluttering along a path through the woods close to the water's edge, and settling on beech twigs. One of these has kindly been presented to the collection of McGill University in the Lyman Entomological Room. On May 24, 1922, Mr. Winn, with six of our members (The Montreal Branch of the Entomological Society of Ontario) was again at St. Hilaire, when an example of *laeta* was seen but unfortunately not captured. I myself saw nothing of it during the season, although I kept a sharp lookout, for it in the little wood near my house, and also on Mt. Orford, which I again visited for ferns on June 26, but this, of course, was too late to hope for much as regards *laeta*.

The dates of capture in this province and in Ontario would indicate a single brood in a season, wintering apparently in the chrysalis stage; but Scudder's capture in Massachusetts above quoted on June 30; Aaron's at Atlantic City July 1; and Smith's at Norway, Me., on July 22, seem to prove that a second brood is found to the south of us.

Scudder sacrificed his specimen in the hope of securing eggs by caging her over wild cherry, but although the abdomen was full of eggs, she lived many days without laying. He gives, however, a drawing executed by Blake, of an egg from a Maine specimen, but by whom or how the same was secured is not stated. In conclusion, I again wish to thank Mr. Winn, not only for having drawn my attention to *laeta*, but also for the notes concerning the localities and dates of the capture of this rare little butterfly.

NOTES ON THE COLEOPTERA OF SOUTHERN FLORIDA WITH DESCRIPTIONS OF NEW SPECIES

BY W. S. BLATCHLEY,
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(continued from page 20)

Cryptocephalus trivittatus Oliv.—An individual of this little dull colored species was sent me by Prof. J. R. Watson. It was taken at Bradentown, August 12, by sweeping grass and herbs in a vacant lot. Not before recorded from Florida. Superficially it resembles *C. incertus* Oliv., to which it is closely related, but differs in the densely punctured thorax, that of *incertus* being almost smooth. I have but two specimens of *trivittatus* from Indiana. It occurs mainly in the middle and eastern States, but is nowhere common.

Bassareus detritus (Oliv.).—Three specimens taken March 29th by beating Spanish moss and foliage in a partly drained cypress swamp along the margin of Lake Istokpoga. I can find no definite previous record of its occurrence in the State.

Leng in his Catalogue has, in my opinion, wrongly made *Cryptocephalus binominis* Newn. a synonym of this species. Newman's species is frequent in Florida, and is a true *Cryptocephalus,* the flanks of the front margin of the thorax being entire and the male not having a strong erect spine on prosternum as in *detritus.* In addition to these generic characters, the two are very different as follows.

Antennae very slender, in male as long as body, thorax subopaque, strongly narrowed in front; black area at base of elytra extending the full width and covering humeri; striae of elytra deeply impressed, the sixth and seventh interrupted, their punctures confused; intervals distinctly convex. ..... *detritus.*

Antennae less slender, half the length of body; thorax shining, but slightly narrowed in front; black area at base of elytra limited to the central portion, the humeri broadly red; striae of elytra not impressed, the punctures coarse, distant, all the rows entire; intervals flat ..... *binominis.*

The *C. notatus* Feb. of Haldeman[17] is the same as *B. detritus,* while his *distinctus* is a synonym of *C. binominis.* The *C. quadrimaculatus* Say, which Leng has placed as a variety of the true *C. notatus,* is quite similar in size and appearance to *binominis* but has the base of the elytra red, the striae slightly impressed, their punctures more numerous and much more closely placed.

Rhabdopterus blatchleyi Bowditch.—This species has been recently described[18] from examples taken by me at Dunedin. As stated by its author, they differ from the northern *R. piceipes* (Oliv.) mainly in being larger, stouter and more oblong, in the antennal joints 7, 10 and 11 being dark, and in the males having the apical half of hind tibiae compressed and rather strongly dilated. It is a rather common form in southern Florida, having been taken at nearly all the stations where collecting has been done by sweeping low herbage in early spring.

Leconte[19] arbitrarily, without seeing Olivier's type, made Say's *Colaspis praetexta* a synonym of *C. piceipes* Oliv. In this he was followed by Horn[20]

17—Journ. Phil. Acad., 1849, 255.
18—The Entomologist, LIV, 1921, 234. London.
19—Complete writings of Say, II, 211.
20—Trans. Amer. Ent. Soc., XIX, 1892, 227.

who states that his principal reason for so doing was that Lefevre in founding the genus *Rhabdopterus* had placed *piceipes* therein, "and as we have no representatives of the genus in our fauna other than *praetexta,* the conclusion must be that *piceipes* and *praetexta* are the same." The statement that there is but one species of *Rhabdopterus* in our fauna is a rather strange one for a man of Horn's ability to make, as new forms in almost all genera are continually being discovered. It of course is possible, but not probable, that as good an entomologist as Olivier would have given the name *piceipes* to an insect having as pale legs as does our northern form of the genus. On the whole it seems to me that it would be better to retain for our northern species the name *praetexta* Say until by comparison with Olivier's type it is shown to be the same as that species.

Paria canella opacicollis Lec.—Regardless of color it appears to me that this name should be retained for a form occurring in Indiana, Kansas and Florida, and probably in intervening territory. It is larger (3.3—4 mm.) than the variety usually known as *aterrima,* and always has the thorax subopaque, distinctly *alutaceous,* minutely and very sparsely punctate and the elytral striae finely and closely punctate. As once before stated by me[21], I have found that the presence or absence of an alutaceous surface is one of the most stable characters to be used in separating closely related species of Coleoptera. While *P. opacicollis* was described[22] from Kansas specimens, which were pale yellow in color and with black spots on elytra, it has been placed by most recent authorities (probably because the majority of the examples are black) as a synonym of var. *aterrima* Oliv. Among numerous specimens examined, I have found none with the thorax intermediate in sculpture between this and the other varieties of *P. canellus,* and the punctures of the striae are distinctly finer and closer set than in any. Specimens are at hand from Gainesville, Fla., and several stations in Indiana.

Calligrapha cephalanthi (Sz.).—This species has been taken at Ft. Myers by Davis. It is known only from Florida, where it occurs on the buttonbush, *Cephalanthus occidentalis* L., but has not before been noted south of Tampa. It is distinguished from its nearest ally, *C. similis* Rogers, by its more oblong form, very coarse punctures of femora and the lack of a median notch on the outer side of discal brown stripe of elytra.

Galerucella sexvittata (Lec.).—Numerous specimens were taken at Dunedin March 1st by sweeping foliage along the margin of a hammock and one at Lake Wales, March 31st; the first records for the State. Horn gives its range as Pennsylvania to Louisiana.

Phyllobrotica discoidea (Fabr.).—One female taken at Ocala April 14th. Not before recorded south of Georgia.

Oedionychis gibbitarsa (Say).—This common northern species had never been found by me in Florida until a half dozen or so were taken at Moore Haven, March 23, while sweeping low vegetation along the edge of a marsh. They have the elytra a deep cobalt blue in hue, not green as in the northern form. The head, thorax and femora are carmine red, not dull yellow as there, and the fuscous spots of thorax are five in number, not three or four as in the northern form, three of these forming a triangle at center and one on each side. A specimen

21—Journ. N. Y. Ent. Soc., 1921, 17.
22—Col. of Kans. & N. Mex., 1859, 23.

taken by Davis at Pablo Beach has the same combination of colors and the form probably represents a distinct southern race of *gibbitarsa*.

Oedionychis ulkei Horn.—This species occurs sparingly about Dunedin from February to April on the flowers of Ericads. Described from Florida without definite station record. Very close to *O miniata* (Fabr.) but averaging smaller, more oblong, with joints 3 and 4 of antennae subequal.

Oedionychis saltatra sp. nov.

Oval, subdepressed, shining, nowhere alutaceous. Dull yellow; elytra piceous, their tips and the narrow edge of side margins pale; antennae pale, joints 6—11 piceous, third and fourth equal, each twice the length of second. Hind femora often brownish-piceous. Head wholly pale, impunctate, a deep transverse impression between the eyes. Thorax more than twice as wide as long, margins feebly curved, rather broadly explanate, disk smooth. Elytra as wide at base as thorax, the sides thence broadly but evidently curved to apical fourth, then rounded to tips; side margins very narrowly explanate, the epipleura in great part vertical; disk minutely, sparsely and very shallowly punctate. Abdomen and femora finely and sparsely punctate, each puncture bearing a small, recurved bristly hair. Length 4—5 mm.

Dunedin and Sanford, Fla., February 20th—June 10th. Frequent about Dunedin in spring on low herbage in moist ground; taken at porch light in June. This species has the oval elytra of *limbalis* Melsh., but differs from the dark form of that species in having a nonalutaceous impunctate head and thorax and in the much finer and shallower punctures and the distinctly narrower and darker margins of elytra. By its elytral characters it would fall under the No. 2 of Series B of Horn's Key[23], but is different from any one of the three species there included. *O. limbalis* has not as yet been reported from Florida.

Oedionychis quercata obsidiana (Fabr.).—Two specimens of this form, having the thorax piceous with only the explanate side margins pale, were taken at Sanford March 31st. It is listed by Schwarz as *quercata* var. and is placed by Leng as a synonym of *quercata*. The typical northern form of the latter with thorax wholly pale has not been taken by me in Florida, nor can I find any definite record of its occurrence in the State.

Disonycha caroliniana (Fabr.).—This species was frequent at Palmdale, March 27th, on a tall shrubby St. Johns-wort. It has also been taken rarely at Dunedin, Lakeland and Lake Wales. About half of the specimens at hand have the thorax devoid of fuscous spots.

Haltica litigata Fall.—This is a common species in Florida, a part of Fall's types having been from Enterprise. I have taken it at the majority of my collecting stations and formerly confused it with both *ignita* Ill. and *amoena* Horn, probably neither of which occur in Florida. It is found in numbers in both Florida and Indiana on the water purslane, *Ludwigia palustris* Ell.; also beneath debris and decaying vegetation about the margins of extinct wet weather ponds and lakes, and at porch light.

Epitrix cucumeris Harr.—Strange to say this common northern little flea-beetle has not been reported from Florida, though its range is given as New England to Georgia and California. It was found in numbers, in company with

23—Trans. Amer. Ent. Soc. XVI, 1889, 190.

Chaetocnema quadricollis Sz. and *C. obesula* Lec., in gardens and low waste places, at Moore Haven and several of the stations around the south end of Lake Okeechobee, and the three, supposed by the natives to be one species, were said to do much damage to egg plant, cucumbers and other truck crops of that region.

Mantura floridana Crotch.—Occurs in March by hundreds on a species of *Rumex* along the bay beach at Dunedin; also occasionally on other low vegetation inland.

Chaetocnema floridana sp. nov.

Elongate-oval, strongly convex, relatively slender, tapering behind. Black with a brassy tinge; antennae with basal joints reddish-brown, fuscous beyond the middle; femora piceous-brown, bronzed, tibiae and tarsi reddish-brown. Head with occiput minutely alutaceous, rather coarsely, sparsely and deeply punctate; front between the antennae with a few coarse deep punctures. Thorax one-half wider than long, convex, sides declivent, their margins regularly curved, somewhat unevenly thickened; disk minutely alutaceous, rather finely and evenly, not densely punctate, its basal marginal line very fine, obsolete at middle. Elytra oval, not wider at base than thorax, distinctly tapering behind the middle; striae all regular, scarcely impressed, marked with coarse, well spaced punctures; intervals very narrow, slightly convex, not visibly alutaceous or punctate. Ventral segments of abdomen each with two or three irregular transverse rows of fine, deep punctures, the last one sparsely, irregularly, rather coarsely punctate. Length 2—2.2 mm.

Described from seven specimens taken at Dunedin and Lakeland, Fla., February 16th—April 24th. Taken by sweeping huckleberry and other low vegetation in open pine woodlands. This is the species recorded[24] by me as *C. cribrifrons* Lec. A recent careful study of all my species of the genus, supplemented by comparisons with Leconte's types for me by Mr. Fall, shows it to be very different from *cribrifrons* in its much smaller, narrower, more tapering form, less densely punctate thorax, narrower impunctate elytral intervals, more sparsely punctate last ventral of abdomen and other characters. The true *C. cribrifrons* has, therefore, not as yet been correctly recorded from Florida.

Chaetocnema minuta Melsh.—This little species is not mentioned in the Schwarz list or manuscript, but is recorded[25] by Horn as occurring in Florida without definite station. It occurs sparingly about Dunedin in March and April on the low vegetation of moist soils.

Chaetocnema alutacea Crotch.—One specimen taken at Dunedin, April 8th, by sweeping low herbage along the margins of a hammock. While Schwarz lists this as common on swampy meadows at several points along the east coast, it has not before been recorded from the western portion of the State, and his record may refer to *C. robusta,* described below. Horn gives its range as "northern Georgia to Florida."

Chaetocnema robusta sp. nov.

Oblong-oval, convex, very robust for the genus, but little narrowed before and behind. Black, subopaque with a faint, brassy tinge; antennae piceous-brown throughout; femora black, tibiae and tarsi dark reddish-brown. Head

24—Can. Ent., LI. 1919, 66
25—Trans. Amer. Ent. Soc., XVI, 1889, 263.

broad, minutely alutaceous, impunctate. Thorax subquadrate, one-third wider than long; sides broadly, regularly curved; disk alutaceous, finely, evenly, rather sparsely and deeply punctate. Elytra not wider at base than thorax, sides very slightly curved; humeri scarcely evident; umbones feeble, smooth; striæ all regular, rather deep, their punctures coarse, close-set; intervals minutely alutaceous, slightly convex, scarcely wider than the strial punctures, each with a single row of minute punctures. Abdomen very finely and remotely punctate. Length 2.7—3 mm.

Described from numerous specimens taken on Hog Island, opposite Dunedin, where it occurs in areas flooded at high tide, on the fleshy-leaved seaside plant, *Batis maritima* L. It has been in my collection and that of Mr. Fall for several years, under the name *C. alutacea* Cr., but on taking the specimen of that species above mentioned, I sent both it and specimens of *robusta* to Fall, who compared them with the type of *alutacea* in the Cambridge Museum, and found that what we had as *alutacea* was wrongly determined and probably an undescribed species. His specimens are in part from Mobile, Ala., and Tybee Island, Ga. It is easily distinguished from *alutacea* in form alone, being larger, more robust and oblong-oval, not elongate-oval, and strongly tapering behind as there. The uniform dark antennæ and reddish-brown tibiæ and tarsi are also excellent distinguishing characters.

Chaetocnema crenulata Crotch.—A single specimen of this short, broadly oval species, taken by Watson at Gainesville, is at hand. Recorded by Schwarz as rare in Sumter County and known only from Florida and North Carolina.

Chaetocnema quadricollis Sz.—Common in truck patches at various stations around the margins of Lake Okeechobee, where it is said to do much damage to different kinds of vegetables. It is not as yet known from the West Coast region. Horn in his description (loc. cit. p. 267) says that the head is impunctate, but it bears "a few scattered punctures," as stated by Schwarz.[26]"

In addition to the six species of *Chaetocnema* above mentioned, I have from Dunedin and other stations along or near the west coast, numerous specimens of *C. brunnescens* Horn, *C. pinguis* and *obesula* Lec. and *C. confinis* and *pulicaria* Crotch. Two additional species, not as yet taken by me, making thirteen in all, have been recorded from the State. These are *C. denticulata* (Ill.) and *C. parcepunctata* Cr.

As noted by me in a recent paper[27], the small Halticids belonging to the genus *Longitarsus* are much more numerous in this country than has been generally supposed. In an accompanying key to the paper cited, 19 were treated as occurring in the Eastern States, and other undescribed forms which were on hand were not there included. Three of these are from Florida and are herewith described.

Longitarsus tenuicornis sp. nov.

Elongate-oval, convex, winged. Dull reddish-yellow throughout, strongly shining. Head with front strongly compressed and subcarinate between the bases of the antennae, the sides just below the antennae with two or three coarse punctures; occiput smooth, not alutaceous. Antennae very slender, two-thirds the

26—Proc. Amer. Phil Soc., XVII. 1878. 368.
27—Journ. N. Y. Ent. Soc., XXIX, 1921, 18.

length of body, the terminal joint fusiform, pointed, in part dusky, joints 2, 3, 4 subequal in length, each one-third shorter than 5—11, which are also subequal. Thorax subelliptical, but slightly wider than long, side margins curved, thickened throughout, more so behind the front angles; disk minutely alutaceous, very finely and sparsely punctate. Elytra oval, about one-third wider at base than thorax, umbones evident, not prominent, sides very feebly curved, their tips conjointly rounded, not covering the pygidium; disk not at all alutaceous, relatively coarsely, closely and deeply punctate, the punctures separated by their own diameters. Abdomen and hind femora minutely very sparsely punctate, each puncture bearing a fine appressed yellow hair. Length 1.7—1,9 mm.

Sanford, Dunedin, La Belle, Moore Haven and Ft. Myers, Fla., November 21st—April 4th. Common on low vegetation about the borders of ponds and lakes and at Dunedin on the fleshy crucifer, *Cakile edentula* (Bigel), along the bay front. In January I have on several occasions taken it by sifting along woodland paths. Next to *L. cotulus* it is the most common member of *Longitarsus* in southern Florida, and perhaps occurs in collections from that State under the name *testaceus* Melsh., which in the past has been a sort of catch-all for species wholly testaceous in hue. In my recent key to the eastern species above cited, it belongs under *h.*, with the exception that only the thorax is alutaceous. From both *cotulus* and *testaceus* it is easily separated by its nonalutaceous elytra and from *suspectus*, which it closely resembles, by the same character, and by the more slender antennae, joints 2—4 of which are subequal, by the exposed pygidium and other characters.

Longitarsus aeneola sp. nov.

Elongate-oval, subdepressed. Pale brown with a bronzed lustre, strongly shining; elytra each with a large, vague, ill-defined yellowish spot on and behind the humerus, and another at apex; antennae fuscous, joints 1—3 paler; under surface brown, the last two ventral segments paler; legs yellow. Head impunctate, the front but moderately compressed between the eyes. Antennae half the length of body, relatively stout, joints 2—4 subequal, 5—11 also subequal, each about one-third longer than 4. Thorax quadrangular, about one-third wider than long, sides curved, their margins thickened, uneven; disk finely, not closely, distinctly punctate, its sides but feebly declivent. Elytra elongate-oval, humeri rounded, umbones absent, sides very feebly curved, tips broadly separately rounded, not covering the pygidium; disk finely, closely, rather shallowly punctate; abdomen smooth. Length 1.8 mm.

Caxambus, Fla., March 6th; one specimen swept from low herbage near the margin of a salt water lagoon. In its subdepressed form, peculiar color of elytra, strong brassy tinge of upper surface and rounded tips of elytra it differs from all other described species. While the elytra are about one-fourth wider than thorax and the humeri evident, the umbones are absent and it appears to be wingless. It is probably a submaritime and subtropical form.

Longitarsus impuncticollis sp. nov.

Elongate-oval, strongly convex, wingless. Dark chocolate-brown, shining: antennae fuscous, joints 1—3 a little paler, 2—4 subequal; legs reddish-yellow. Head and thorax absolutely smooth, strongly shining, the latter subcylindrical, its sides strongly declivent, their margins evenly curved. Elytra at base not wider

than thorax, at middle one-third wider, humeri and umbones absent; sides feebly curved, tips narrowly rounded, not covering the pygidium; disk coarsely, densely and deeply punctate. Abdomen smooth. Hind tarsi longer and more slender than in allied species, the spur of hind tibiae also longer and more curved. Length 1.5 mm.

Dunedin, Fla., February 28th; swept from vegetation along the margin of a pond. Belongs under *nn.* of my key above cited, and allied to *solidaginus,* but easily separated by its longer, narrower, more attenuate form, smooth thorax, dark antennae and slender hind tarsi.

THE NAIAD OF PANTALA HYMENEA (ODONATA)

BY CLARENCE HAMILTON KENNEDY,
Ohio State University, Columbus, Ohio.

In March, 1920, the writer identified a series of Odonata naiads for the U. S. National Museum. Among these was a single Pantala naiad from Plano, Texas, which did not agree with the published descriptions of that of *Pantala flavescens.*[1] It was ascribed to *hymenea* (Say), as the only other species of that genus known.

While on a recent visit to Mr. Williamson at Bluffton the writer was given reared material of *hymenea,* several grown naiads and was given an auto ride to the place of their occurrence. This Bluffton material came from two concrete watering troughs on a farm east of Bluffton that was not far from a muddy seasonal slough. These troughs were about six feet long and two feet deep, containing at the time of our visit, about eighteen inches of algal filled water. Thirteen quarter-to-half-grown individuals of *hymenea* were raked out of one trough with an insect net. Many Corixas, of at least two species, Notonectas, two species, Mayflies and Chironomids, were obtained also, showing what a rich feeding ground the Pantalas enjoyed.

The interesting thing about the location was the fact that these troughs were cleared out and scrubbed at fairly regular intervals. So that counting back from the date of the emergence on Sept. 9, 1921 of Mr. Williamson's specimen, the trough had been cleaned twice, on July 15, 1921, when the specimens were brought in by the farmer and once previous to that, when all insects were thrown away. This previous cleaning had taken place, as well as the farmer could remember, at a date which was less than three months previous to Sept. 9, the date of the emergence. This gives a short life history to *hymenea.* With its marvelous powers of flight and ability to mature quickly in such shallow pools as are represented by a horse trough, we can get a glimpse of one of the reasons for the very wide spread of this species from Canada to the Argentine. Probably the same is true of its relative *flavescens* which is the only truly cosmopolitan dragonfly, for it is found throughout the tropics and even in such out of the way places as the Hawaiian Islands.

Probably other factors than the very short life history enter into the phenomenal success of these species, such as the very thin chitinous skeleton of

1—Needham, "Aquatic Ins. of Adirondacks" Bull. N. Y. State Mus. No. 47, p. 539, 1901.
2—From Needham's description "Aquatic Insects in the Adirondacks" Bull. 47, N. Y. State Mus. p. 539, 1901.

the naiad which must take little of the insect's growing power as compared to the very heavy shells of the primitive Odonata, also the truly wonderful flight of these species, for one cannot observe these on the wing without being impressed with their nonchalance and great ease on the wing, a sense of being undisturbed and completely at home in the air, come what may. This placid indifference while on the wing would make them victims of high flights and storms, and so might help account for their wide distribution.

The naiad differs from that of *Tramea lacerata* in that the lateral spines of segment 8 are barely as long as the mid-dorsal line of segment 9, while the mid-dorsal appendage is as long as the paired ventral appendages.

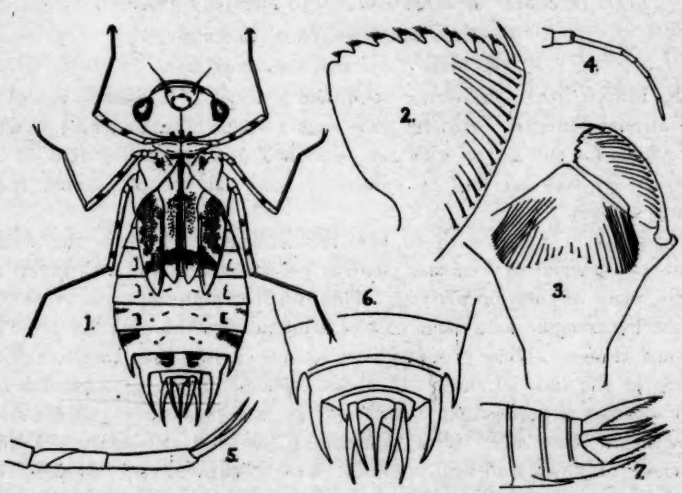

Fig. 1, Naiad of *Pantala hymenea* reared by E. B. Williamson, Figs. 2-7 details of same. 2. Lateral lobe of labium, 3. Labium. 4. Antenna. 5. Tarsus of hind leg. 6. Segments 8-10, dorsal view. 7. Segments 8-10, lateral view.

It differs from the naiad of *Pantala flavescens* in that the movable hook on the lateral lobe of the labium is twice as long as the crenulations of the distal edge of the lobe[2], while body measurements indicate that it is slenderer than the *flavescens* naiad.

The following is a description of the naiad of *Pantala hymenea*. Total length 28 mm.; abdomen 18 mm.; hind femur 7 mm.; width of abdomen 6.5 mm., of abdomen 10 mm.

Body clean, smooth and moderately depressed, six mm. high as compared to the width of 10 mm. A pair of conspicuous black spots on the dorsum of segment 9 and a second pair on the outer edges of segment 8. A less conspicuous pair, U-shaped, on segment 7, remote from its edges. A black spot at the base of each inferior appendage. Other pairs of minute spots on the abdomen as shown in fig. 1. Wing pads heavily mottled, the major part of which pattern is a broad band across their tips. Three less conspicuous spots on each side of the thorax. Legs with two bands on the femur while the tarsus is black. Three small, black spots on the occiput.

Head broad, two thirds as long as wide. Occipital "angles" rounded, occiput convex. Vertex prominent, surrounded by a distinct though shallow fossa. Antennæ, fig. 4, with the third segment longest, about twice the length of segment two, and three times the length of segment four. Labium with ten crenulations on its distal edge, those on the outer edges longer than wide, but towards the inner edge becoming flattened out so that the sixth to the tenth are broader than high. Movable hook twice as long as the highest crenulation. Lateral setæ 15, mental setæ 17—18, the outer ten set almost touching each other at their bases, the inner seven three times as far apart. Number 10 from the inner end the longest. See figs. 2 and 3.

Prothorax smooth. Legs slender. Minute, needle-like dorsal hooks on segments 3 and 4. Lateral spines, on segments 8 and 9 only, long and incurvate, those on segment 8 reaching the apical border of the ninth segment, those on segment 9 twice as long and reaching to the tips of the dorsal lateral appendages. Mid-dorsal and inferior paired appendages slightly longer than the combined lengths of segments 8—10, the dorsal-lateral appendages slightly shorter. All the appendages and lateral spines slender and needle-pointed.

OUR NORTH AMERICAN *LEUCOZONA*, A VARIETY OF *LUCORUM*. (SYRPHIDAE, DIPTERA)*

BY C. HOWARD CURRAN,
Ottawa, Ont.

Leucozona lucorum var. **americana** new var.

A comparison of seven specimens of *Leucozona* from North America and five specimens of *L. lucorum* L. from Denmark and England shows that the American specimens are either a very good variety of *lucorum* or a distinct species. I am inclined to believe the two distinct, but as the genus is so little known, place our form as a variety. The differences between the two are as follows:

L. lucorum americana: Third antennal joint a little shorter; facial tubercle longer, less prominent; pile of the mesonotum and scutellum wholly pale yellow; abdomen wholly black pilose beyond the second segment.

In the typical form the pile of the mesonotum is yellow on the disk and rather tawny on the lateral margins and scutellum; the abdomen is yellow pilose, except on the third segment and sometimes, in the male, a few black hairs on the disk of the fourth segment. The result is that the shining terminal segments appear metallic, while in the variety they are deep black.

Holotype— ♂, Hull, Quebec, June 6, 1903 (W. H. Harrington); No. 545, in the Canadian National Collection, Ottawa.

Allotype— ♀, Metlakatla, British Columbia, Rev. J. H. Keen.

Paratypes— ♂, Hull, Que., June 6, 1903, ♀ Smith's Cove, N. S., July, 1914, (Arthur Gibson); ♀ Chilcotin, B. C., June 29, 1920, (E. R. Buckell); ♀, no data.

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*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

NEW CANADIAN EPHEMERIDAE WITH NOTES*

BY J. MCDUNNOUGH,
Ottawa, Ont.

CAENINI.

Tricorythus atrata sp. nov.

Male. Head and thorax black, the latter shiny; abdomen dull blackish with traces of white intersegmental rings, somewhat paler ventrally. Fore legs blackish, paling towards the extremities, the tarsi being white-tinged; mid and hind legs with blackish femora and white tibiæ and tarsi; setæ white. Wings semi-hyaline with the usual dark mark along the costa. Length of body 2—3 mm.; of wing 4½ mm.

Holotype—♂, Wakefield, Que., Aug. 6, (J. McDunnough); No. 546, in the Canadian National Collection, Ottawa.

Allotype—♀, same data, in the Canadian National Collection, Ottawa.

Paratypes—16♂, 1♀, same data.

The species was common early in the day flying over the La Peche River, a small tributary of the Gatineau, about 20 miles north of Ottawa. Its dark color distinguishes it from *allecta* Needh., from which it also differs in genitalic characters, the apical portion of the penes being drawn to a long point, leaving the basal half broad and roughly diamond-shaped.

BAETINI.

Since my notes on the species of this interesting group found in the Ottawa region (Can. Ent. 1921, LIII, 117) I have continued my studies of them with particular attention to the living material. All three species mentioned in the above paper, *propinquus* Walsh, *intercalaris* McD. and *flavistriga* McD. occurred very plentifully in the neighborhood of the Rideau River during the summer of 1922; there are apparently two generations of each species, as I captured specimens in early June and again from the middle of August until early in September, the second generation being rather smaller in size than the spring one. In the living state the differences in the size of the turbinate portion of the eyes of the males is very noticeable and this, combined with differences in the color of the thorax and posterior segments of the abdomen makes a separation of the males fairly easy; the females, concerning whose identity I was uncertain in my former article, have now also been distinguished; I offer the following descriptions, drawn up from live material, to supplement the previous ones:—

Baetis intercalaris McD.

Male. Turbinate portion of eye large, lengthily oval, deep brown with upper part of stalk yellow; sessile portion of eye black. Face black with inner edge of ocelli, and a spot at the base of the eye, pale yellow-green. Antennæ black, paler at tip with basal joint ringed with yellow at apex. Thorax shiny blackish with lateral edge of mesonotum and posterior protuberances tinged with dull olivaceous; lateral sutures shaded with brown. Abdomen with segments 2—6 hyaline white, 7—10 dorsally umber brown, ventrally opaque white; in the spiracular area the tracheæ are lightly marked with black; setæ white. Legs dirty white, claws black.

*—Contribution from Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Female. Can be distinguished in nature from the females of the other two species by its deep olive brown color and the dark venation of the wings which often have a purplish sheen.

Baetis propinquus Walsh.

Male. Turbinate eyes moderately large, oval, deep brown with upper half of stalk yellow; sessile portion blackish. Face black with light green shading only at base of antennæ; antennæ black with white ring at apex of first joint. Thorax black, shiny, the only traces of pale markings being in the lateral sutures. Abdomen hyaline whitish with segments 7—10 light sepia brown dorsally and opaque white ventrally. Spiracles black. Legs and setæ white, fore femur slightly smoky.

Female. Head olivaceous yellow, slightly marked with red-brown. Thorax dull olive brown marked slightly with yellowish laterally below wings. Abdomen pale yellowish with series of large subdorsal brown spots on segments 2—7, these spots tending to coalesce and form stripes; segments 8—10 unicolorous yellowish, spiracular area slightly marked with black. Legs white, setæ white. In contradistinction to the preceding and following species the veins of the primaries are pale.

Fig. 1. Relative size of turbinate eyes of *a. Baetis intercalaris* McD.; *b. Baetis propinquus* Walsh; *c. Baetis flavistriga* McD.

Baetis flavistriga McD.

Male. Turbinate eye on a long stalk; small, oval, light brown with a yellowish tinge (much lighter than in *propinquus* and *intercalaris*); stalk purple brown with upper third yellow. Face black with pale green markings around base of antennæ and ocelli; antennae blackish. Thorax dark olivaceous (paler than in *intercalaris*) with yellowish shades on the pronotum and an oblique streak along the lateral edge running forward from base of wing; considerable pale yellow markings on the lateral sutures. Abdomen hyaline tinged with pale yellow-brown on segments 2—6, the posterior segments being light umber brown, the contrast between the two colors not being so marked as in the two preceding species; ventrally paler with last segments opaque creamy; spiracular area slightly marked with black. Legs with all the femora pale yellow; other portions dirty whitish.

Female. Head yellow, tinged considerably with dirty olive-brown. Antennæ with basal joint yellow, second joint brown. Thorax and abdomen pale (occasionally dark) olive-brown; prothorax edged with yellow, mesothorax with yellow streak as in male and with posterior protuberances often tinged with yellow; laterally there is considerable yellow shading, noticeably a patch in front of the wings. Abdomen with narrow yellow intersegmental rings; ventrally

paler with last two segments shaded with creamy. Setæ white, smoky at base. Legs smoky with femora tinged with olivaceous.

Besides *Baetis unicolor* Hagen, which in the ♂ sex has the abdomen entirely brown, as in the ♀, several other undescribed species have been discovered in the course of our collecting. A description of these follows:

Baetis phoebus sp. nov.

Male. Turbinate eyes (in living specimen) large, long-stalked, broadly oval, almost circular, upper surface red-brown with a narrow yellow rim. Head and thorax (dried specimen) brown, latter with a yellow streak extending from base of primaries to anterior prominence of mesonotum along lateral edges of same; rear portion of meso- and anterior portion of the metathorax variably shaded with light ochreous; lateral sutures more or less marked with ochreous. Abdomen with segments 1—6 whitish hyaline with very faint olivaceous tinge (less than in *flavistriga*); segments 7—10 bright brown, slightly ruddy dorsally, opaque whitish ventrally, variably tinged with brown; spiracular flange slightly dotted with blackish. Legs very pale yellowish. Wings hyaline with pale cross-nervures; intercalaries well-developed; pair between subcosta and radius no longer than those following; hind wings broad, well developed.

Female. Pale olive or yellowish, ventral portion of abdomen lighter in color than dorsum. Primaries with cross-nervules light brown. Length of body 5 mm.; of fore-wing 5½ mm.

Holotype—♂, Ottawa West, May 25th, 1921 (A. W. Richardson); No. 527 in the Canadian National Collection, Ottawa.

Allotype—♀, Ottawa West, May 27, 1921 (J. McDunnough); in the Canadian National Collection, Ottawa.

Paratypes—9 ♂, 3 ♀, taken by the above collectors in the same locality on May 25 and 27, in the Canadian National Collection.

The species is closely allied to *flavistriga* McD., but is considerably larger; the turbinate eyes are noticeably larger and the pale portion of the abdomen contrasts more with the brown posterior portion, due to the practical lack of olive shading such as is found in *flavistriga*. The specimens were all taken along a small creek just west of the city limits and the females are presumed to belong to this species. Unfortunately building operations have spoiled the collecting ground. Several specimens of what appears to be this species have been taken on our office window at various times, but the series is not large enough for a definite determination.

Baetis dardanus sp. nov.

Male. Very similar to *propinquus* Walsh, but slightly larger and with turbinate portion of eyes also larger. Thorax dark shiny black-brown, as in *propinquus*, with lateral sutures marked in whitish. Abdomen with segments 2—6 hyaline whitish, segments 7—10 brownish-olive (Ridgway Pl. XXX, m) dorsally, opaque white ventrally, shaded with brown; forceps whitish. Along the spiracular line, instead of the black dots of *propinquus* is a faint, ruddy shade. Legs pale yellowish, setæ white. Wings hyaline, the secondaries not angled on costa near base as in *propinquus* but evenly rounded, leaf-shaped.

Female. Light olivaceous, hardly to be distinguished from the same sex

of *propinquus* except by the characteristic shape of secondaries. Length of body 5 mm.; of fore wing 5½ mm.

Holotype— ♂, Aweme, Man., June 11, (N. Criddle); No. 528, in the Canadian National Collection, Ottawa.

Allotype—and 2 ♂ *Paratypes,* same data, in the Canadian National Collection, Ottawa. In the National Collection is also a single specimen from Ottawa, Ont. (Aug. 22; J. McDunnough) which agrees with the above in shape of secondaries and general appearance. Without more material, however, it is unwise to place it under this name definitely.

Baetis nanus sp. nov.

Male. Turbinate eyes small, oval, slightly smaller than in *flavistriga* McD., in living specimens pale yellow-brown, in dried ones bright red, marked with yellowish around rim. Thorax pale olivaceous, at times tinged with smoky posteriorly and with brownish shades on anterior sutures. Abdomen with segments 2—6 semihyaline, dorsally yellowish, with at time faint brown tinges, ventrally dull, pale ochreous, lateral area most noticeably hyaline with spiracular line streaked and spotted with black; segments 7—10 more opaque and shaded dorsally with isabella brown (Ridgway Plate XXX, i); setæ whitish. Femora yellow; remainder of legs dull hyaline whitish. Wings hyaline. Length of body 3 mm.; of forewing 4 mm.

Holotype— ♂, Ottawa, Ont., Aug. 19, 1922, (J. McDunnough); No. 529, in the Canadian National Collection, Ottawa.

Paratypes—4 ♂, same data, in the Canadian National Collection, Ottawa

The specimens were all captured on bushes near the banks of the Rideau River; while the species is close to *flavistriga* it may be readily separated by the color of the eyes in the live ♂, the paler thorax and yellower dorsal area of abdominal segments 2—6. I have not yet succeeded in differentiating the ♀, but have two ♂ specimens taken May 18, 1921, which may represent the spring generation; they are slightly larger and darker colored than the types.

Centroptilum fragile sp. nov.

Male. (living). Eyes with turbinate portion large, narrowly oval, almost kidney-shaped, pale yellow-brown; basal half of stalk purplish with yellow band; sessile portion dull greenish. Face yellowish above and between the ocelli; antennæ light smoky with white base. In dried specimens the turbinate eyes shrivel to bright red lunate disks between which the front appears as a dark gray oval with a V-shaped incision at apex.

Thorax shiny black-brown with pale markings on posterior protuberances; lateral area browner with pale markings at base of wings. Abdomen whitish hyaline slightly streaked with black, especially in stigmatal area; dorsally segments 7—10 rather bright brown, ventrally opaque white; anterior segments slightly tinged with brown and with faint brown intersegmental rings. Legs white. Wings hyaline with single intercalaries.

Female. Head pale yellowish with slight brown striation; ocelli ringed with brown. Thorax light olivaceous with creamy markings on posterior edge of prothorax and lateral edges of mesothorax anterior to the wings; dorsal protuberance white; white edging to metanotum. Abdomen pale yellow-green with

black tracheæ and slight whitish intersegmental rings; ventrally still paler. Length of body 4 mm.; of fore wing 5 mm.

Holotype— ♂, Rideau River, Ottawa, Ont., Aug. 22, 1922 (J. McDunnough); No. 530, in the Canadian National Collection, Ottawa.

Allotype— ♀, same data, in the Canadian National Collection.

Paratypes—3 ♂, same locality and collector, Aug. 16, 1922, in the Canadian National Collection, Ottawa.

A smaller species than *luteolum* Mull, which Eaton records from the Hudson Bay region and with which description two females from Nordegg, Alta., seem to agree; the male forceps lack entirely the conical basal protuberance of *luteolum* said to be characteristic of the species, they resemble closely Eaton's figure (Pl. XVII, fig. 30b) of *C. pennulatum* Eaton.

Centroptilum curiosum sp. nov.

Male. (living). Turbinate portion of eyes large, lengthily oval, deep brown with upper half of stalk pale yellow; sessile portion black. Head black. Thorax shiny black shaded laterally below the wings with brown. Abdomen with segments 1—5 hyaline, shaded slightly dorsally with pale greenish yellow and with a small, round red-brown spot on segments 2 and 3, rarely on 4 and 5; segments 6—10 dorsally light sepia brown, this shading at times extending forward as far as segment 3; ventrally shaded with opaque white; spiracular area often marked with black. Forceps white; setæ white, ringed on basal segments with red-brown. Legs whitish, fore-femora blackish, fore tarsus quite short and only equal to about three-fourths the length of tibiae. Wings hyaline; primaries with two intercalaries, fairly well developed except between Sc. and R and between the anal veins; hind wing present but reduced to a mere thread, much narrower than is typical for *Centroptilum*.

Female. Paler than the male; thorax olive brown; abdomen dirty olive green with segments 2—5 slightly tinged dorsally with yellowish and with brown dots on 2 and 3; segments 6—10 shaded with brown. Length of body 4½—5 mm.; of fore-wing 5—5½ mm.

Holotype— ♂, Ottawa, Ont., Aug. 22 (J. McDunnough) No. 531, in the Canadian National Collection, Ottawa.

Allotype— ♀, same data, in the Canadian National Collection, Ottawa.

Paratypes—14 ♂, 6 ♀, same locality and collector, Aug. 21, 22, 23, in the Canadian National Collection, Ottawa.

The shortness of the fore-legs, the paired intercalaries of the primaries, and the almost entire reduction of the secondaries may call for a new generic name, but for the present I place the species in *Centroptilum*.

The genus *Cloeon* falls into two sections, according to whether the intercalary veins of the primaries are single or paired; the first section is the typical one, contains *vicina* Hag. and *mendax* Wlsh., and seems closely allied to *Centroptilum*. The second section has more affinity to *Baetis* and is represented by *dubia* Wlsh. Several new species occur in Canada which are described as follows:

Section I.

Cloeon rubropicta sp. nov.

Male (dried). Head blackish brown, turbinate eyes long, narrowly oval, shrivelling so as to form lunate lateral disks, leaving the central portion of the

head free, as mentioned under *Centroptilum fragile*; antennae with pale basal joints. Thorax deep brown, slightly ruddy along sutures and edges of meso- and metanotum. Abdomen with segments 2—6 pale yellowish white, segment 2 dorsally with a ruddy inverted "Y" mark, segments 3—6 with slight traces of a ruddy median line and with small subdorsal red dots placed near the segmental incisures; laterally the stigmatal flange is marked by a broken black line and above this are faint red dots, one in the centre of each segment; dorsally segments 7—10 bright red-brown with setæ and forceps whitish; ventrally the posterior segments are opaque whitish; legs entirely pale yellowish white. Wings hyaline with single intercalary veinlets.

Female. Head yellowish; thorax light ochreous to olive brown, shaded below the wings with deeper brown. Abdomen dorsally much the same color as thorax, paling on posterior segments, except 10, which is ruddy; the subdorsal red dots extend along the entire abdomen; black spiracular line as in ♂; ventrally thorax and abdomen entirely pale yellowish; legs yellowish. Length of body, ♂, 3 mm., ♀, 4 mm.; of wing, ♂ 4 mm.; ♀, 5½ mm.

Holotype—♂, Ottawa, Ont., Aug. 19, 1922, (J. McDunnough); No. 532, in the Canadian National Collection, Ottawa.

Allotype—♀, Ottawa, Ont., June 14, 1920 (J. McDunnough), in the Canadian National Collection, Ottawa.

Paratypes—12 ♀, Ottawa, Ont. (June 9, 11, 14, 1920; Aug. 16, 19, 22, 1922) (J. McDunnough); 2 ♂, 1 ♀, Norway Pt., Lake of Bays, Ont. (July 14, 1920; July 1, 1922) (J. McDunnough).

Cloeon ingens sp. nov.

Male. Head smoky, tinged with ruddy; basal joints of antennæ dusky; eyes shrivelled as in preceding species, discolored. Thorax shiny blackish with the sutures tinged with ruddy brown; laterally below the rings heavily shaded with pale brownish. Abdomen with segments 2—6 dorsally dull olive brown, semi-hyaline with the segmental incisures faintly ringed in black and with black markings along spiracular flange; segments 7—10 deep chocolate brown; ventrally dirty whitish with posterior segments opaque and slightly shaded with brown, setæ and forceps whitish, the former tinged with ruddy at base. Legs smoky brown. Wings hyaline with single intercalaries.

Female. Thorax and abdomen above olive-brown shaded with ruddy, especially posterior three segments of abdomen, which are almost entirely ruddy and show traces of maculation in the shape of curved, pale subdorsal lines on anterior portion of each segment. Venter and legs pale ochreous. Length of body 8 mm.; of wing 9 mm.

Holotype—♂, Nordegg, Alta., Aug. 3, 1921, (J. McDunnough); No. 533, in the Canadian National Collection, Ottawa.

Allotype—♀, Banff, Alta., Aug. 4, 1922, (C. B. Garrett), in the Canadian National Collection, Ottawa.

The two sexes may not be correctly associated, but similarity of size and general habitat leads me to place them together. It is the largest species as yet reported from North America.

Section II.

The commonest *Cloeon* species found along the Rideau River at Ottawa

is one to which I am applying the name *dubia* Walsh. As stated by the author, it bears a marked similarity to *Baetis propinquus* Wlsh., but lacks hind-wings and is smaller; the males of our Ottawa specimens do not possess the black lateral spiracular dots mentioned by Walsh, but often show a faint, dark spiracular line; the turbinate eyes are considerably smaller than in *propinquus* and almost circular, in living specimens the upper surface is ruddy brown; the thorax is shiny black and the abdomen hyaline with segments 7—10 dorsally pale umber brown, rather paler than in *propinquus*. The species is double-brooded, occurring in May and June and again in August and September.

Two other closely allied species have been taken sparingly along with *dubia*; the one is distinguished by its larger turbinate eyes and by the presence of a row of minute dots centro-ventrally on the abdomen, the second, which has only been captured in August, differs markedly in the living state by the color of the turbinate eyes, which are yellow-green. I propose the following names for these:

Cloeon punctiventris sp. nov.

Male (living). Turbinate eyes almost circular, larger than in *dubia* Wlsh., light yellow-brown, stalk paler and ringed with purple-brown just above base. Face blackish, base of ocelli and antennæ tinged with pale yellowish green; antennæ black, paling towards tip, first joint with pale apical ring. Thorax blackish with light olive shading laterally and slight greenish markings on anterior portion and lateral edge of mesothorax and on the dorsal protuberances. Abdomen hyaline whitish with segments 7—10 light brown (rather ruddier than in *dubia*) dorsally and opaque white ventrally; faint black spiracular dots on the pale segments and a centro-ventral row of minute dots placed on the posterior margin of each segment. Setæ white. Legs whitish, fore femora generally tinged with smoky. Wings hyaline with paired intercalaries.

Female (dried). The single female which I incline to associate with the above ♂ has the head, thorax and dorsal surface of abdomen light olivaceous brown; the ventral abdominal region is whitish with the centro-ventral row of brown dots much larger than in the ♂. Length of body 3—4 mm.; of wing 4—4½ mm.

Holotype—♂, Rideau River, Ottawa, Ont., Aug. 19, (J. McDunnough); No. 557 in the Canadian National Collection, Ottawa.

Allotype—♀, Ottawa, Ont., June 4, (J. McDunnough), in the Canadian National Collection, Ottawa.

Paratypes—5 ♂'s, same locality and collector, June 3, Aug. 19, 22, in the Canadian National Collection.

There is also a vial containing ten ♂'s of this species in alcohol, collected on May 20, 1921, which may be considered as Paratypes. As is usual in this group, the spring specimens are somewhat larger than the fall ones.

Cloeon chlorops, sp. nov.

Male (living). Turbinate eyes similar in size to those of *dubia*; yellow-green with a purple-brown band at base of stalk (in dried specimens the eye appears deep purplish with a broad outer edging of pale red-brown). Head shiny black, ringed with greenish around antennæ and ocelli; thorax blackish, shiny, with pale lateral sutures and slight greenish shades on anterior portion of mesothorax; abdomen hyaline with faint yellowish tinge, segments 7—10 pale

brown (rather ruddier than in preceding species) the color extending more or less over ventral surface; a faint brown spiracular line. Setæ white. Legs whitish with smoky fore femora. Wings hyaline with paired intercalaries. Length of body 3 mm.; of wing 4 mm.

Holotype— ♂, Ottawa, Ont., Aug. 16, (J. McDunnough); No. 558 in the Canadian National Collection, Ottawa.

Paratypes—8 ♂'s, same data, in the Canadian National Collection, Ottawa.

Cloeon virilis sp. nov.

Male. Head blackish; eyes (dried) large, oval, deep red-brown; antennae blackish. Thorax shiny black with the anterior lateral edge of the mesonotum to base of wing with pale yellow streak; lateral and ventral sutures slightly pale-marked. Abdomen with segments 2—6 hyaline, dorsally with faint tinge of ruddy on segmental incisures and two minute, red subdorsal dots on anterior part of each segment; laterally the tracheæ of the stigmatal area are strongly outlined in black, segments 7—10 dorsally chocolate brown; ventrally entire abdomen pale with faint, medio-ventral ruddy dots on segments 5 and 6 and considerable ruddy shading on 7 and 8; forceps and setæ pale. Fore-leg with femur and base of tibia smoky yellow, remainder pale whitish; other legs whitish with apex of femur and a median band pale purplish-red. Wings hyaline with paired intercalaries. Length of body 4 mm.; of wing 5½ mm.

Holotype— ♂, Ottawa, Ont., June 7, 1922, (J McDunnough); No. 534, in the Canadian National Collection, Ottawa.

A larger and chunkier species than any so far taken at Ottawa.

SIPHLONURINI.

The key as given by Needham (Bull. 86, N. Y. Sta. Mus., 25, 1905) for the separation of the *Siphlonurus* group of genera is not entirely satisfactory and is capable of misinterpretation by one unfamiliar with the species of this group. His first main subdivision is as follows:

g. Median caudal seta a distinctly segmented rudiment; forceps of male three-jointed; posterior prolongation of sternum of ninth segment of abdomen of female bifid at tip.

gg. Median caudal seta more rudimentary or wanting; forceps of the male distinctly four-jointed; posterior prolongation of the sternum of the ninth abdominal segment in the female entire at tip.

Under the first heading he places *Coloburus* and *Chirotenetes* (*sic*); under the second *Siphlurus* (*sic*) and *Ameletus*.

The segmentation or non-segmentation of the aborted median caudal seta is a poor character on which to separate two main groups, especially when dried material is being examined. I have found specimens of *Siphlonurus triangularis* Clem. which show a distinct segmentation of this seta and other specimens, which undoubtedly fall into Needham's *Chirotenetes,* possess an almost entirely aborted seta, with no trace of segmentation. The characterization of the male forceps as three and four-jointed is misleading; in *Siphlonurus triangularis* Clem., for instance, only three joints can be distinguished, the basal one being doubtless fused with the ventral plate, whilst in some species of *Chirotonetes* the splitting of this plate into two lobes certainly gives the appearance of a basal fourth joint.

Finally, while the bifid nature of the ninth abdominal plate in the female is very pronounced in *Chirotonetes*, it is also very slightly noticeable in the type species of *Ameletus* (*subnotatus* Eaton), and the character must be used with caution. As a basis for primary separation I find it more satisfactory to use a character found in the tarsal claws; the dissimilarity of these claws in each tarsus separates *Ameletus* (and incidentally *Coloburus*, which is not a North American genus) from *Siphlonurus* and *Chirotonetes*. To separate the two latter genera the position of the fork of the median vein of the hind-wing can be used very advantageously; this character has the advantage of being readily seen and of being present in both sexes. In this connection it may be stated that *Chirotonetes* Eaton (misspelt *Chirotenetes* by Needham and others) will fall to *Isonychia* Eaton; this latter generic name was proposed in 1871 (Trans. Ent. Soc. Lond., 134) for *manca* Eaton and *ignota* Wlk.; in 1881 (Ent. Mon. Mag. XVIII, 21) Eaton proposed the name *Chirotonetes* to replace *Isonychia*, under the impression that it was preoccupied by *Isonychus* Mannh., and used this term in his monograph (1885, Mon. Rec. Eph. 203) with type specified as *ignotus* Wlk. As, however, under the international Rules of Nomenclature, *Isonychia* Eaton is perfectly valid, it must again be used, with *Chirotonetes* as synonym, and *generic* type, *ignota* Wlk.

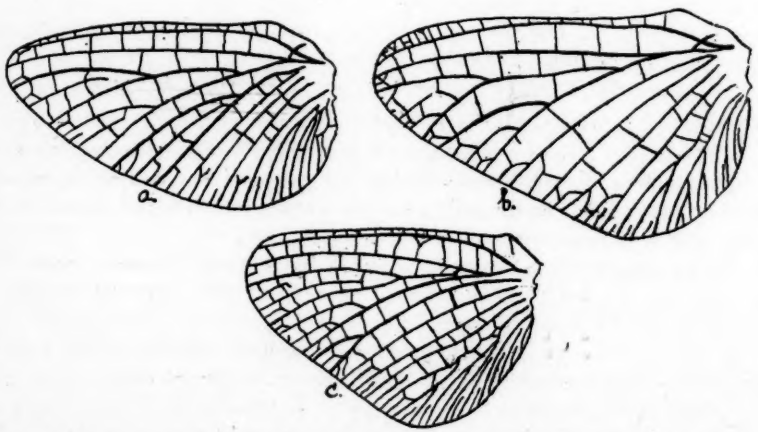

Fig. 2. Hindwings of *a. Siphlonurus triangularis* Clem.; *b. Siphlonuroides croesus* McD.; *c Isonychia mancus* Eaton.

The median vein of the hind-wing, mentioned above, is forked for fully half its length in *Siphlonurus*, whereas in *Isonychia* it is quite short and the fork occurs in the outer fourth of the vein; in still another group, which seems of generic value, there is no fork at all, and for such species I propose the term *Siphlonuroides*. *Siphlonisca* Needh., which has not yet been reported from Canada, may be separated by the broad expansions of the abdominal segments and *Siphloplecton* Clem. (1915, Can. Ent. XLVII, 258) obviously falls into the Heptageninæ, as it shows the two pairs of intercalaries between the first and second anal veins; in fact the type species, *flexus* Clem., is a synonym of *basalis* Wlk. treated by Eaton under *Heptagenia* (Mon. Eph. p. 298).

For separation of our Canadian genera in this group the following key is offered:—

1. Claws of each tarsus dissimilar ..... *Ameletus.*
   Claws of each tarsus similar ..... 2.
2. Median vein of secondaries unforked ..... *Siphlonuroides.*
   Median vein of secondaries forked ..... 3.
3. Fork of median vein of hind-wings long, occurring at about half its length; posterior prolongation of sternum of ninth abdominal segment in female entire at tip ..... *Siphlonurus.*
   Fork of median vein of hind-wings short, occurring at about three-fourths of its length; posterior prolongation of sternum of ninth abdominal segment in female bifid at tip ..... *Isonychia.*

Siphlonuroides gen. nov.

Similar in general characters to *Siphlonurus* Eaton, but distinguished by the lack of a fork to the median vein of hind wings. Type of genus; *S. croesus* sp. nov.

Siphlonuroides croesus sp. nov.

Male. Head pale yellowish, marked with black at base of ocelli and along the central ridge. Thorax dull brown, the mesothorax shaded with yellowish anteriorly, most prominently along the median suture; a broad black line from base of primaries to lateral edge of prothorax, bordered on each side by yellowish; posterior portion of meso- and metathorax shaded with pale orange with the central tubercle blackish. Abdomen dorsally dull brown with lateral triangular pale patches on anterior portion of each segment; these pale triangles are improminent on the first seven segments, and are semi-transparent; on the three last segments they are brighter yellow and more opaque, especially prominent on the tenth segment; traces of subdorsal dark streaks, especially on posterior segments; ventrally the abdomen is yellowish with a large brown quadrangular patch on each segment which leaves the ground color only visible along the anterior margin and as a lateral triangular patch; ninth segment entirely brown except a small, yellow anterior triangle. Forceps and basal plate brown, the latter deeply notched on posterior margin. Setæ black-brown with slightly deeper colored rings marking the segmentation. Fore-legs deep brown, femur paler along upper margin and at apex; mid and hind legs dull olive-brown with darker tarsi. Wings hyaline with dark veins, primaries clouded with pale umber brown over the inner two-thirds of the wing, except for the costal half of the wing at the extreme base, which remains colorless; secondaries with an umber-brown shade along the costa.

Female. Head yellow, bordered anteriorly by a dark band and with subdorsal dark brown bands from rear of each lateral ocellus to posterior margin of head. Maculation of body similar to that of the male, with the subdorsal dark streaks better defined. Wings without any umber brown shade. Length of body 12—13 mm.; of fore-wing 13 mm.

Holotype—♂, Ottawa, Ont., May 22, 1922, (J. McDunnough); No. 522, in the Canadian National Collection, Ottawa.

Allotype—♀, same data, in the Canadian National Collection, Ottawa.

Paratypes—1 ♂, 2 ♀, same locality and collector, May 22; 2 ♀, May 29, in the Canadian National Collection, Ottawa.

Siphlonuroides midas sp. nov.

Male. Head blackish; thorax olive brown, shaded with paler yellowish olive anteriorly in median line, and on the posterior tubercle of the mesothorax. Abdomen dorsally brown with the segmentations distinctly marked in blackish, ventrally duller and paler brown with only the faintest trace of maculation, in the shape of small lateral darkish spots on each segment; setæ brown with darker intersegmental rings. Legs olive brown, the fore legs deeper in color than the others. Wings hyaline with dark veins, a faint trace of brown shading on primaries between subcosta and vein R_1 at basal half of wing, a brown dot at base above inner margin and a very faint shade along costa before apex of wing.

Female. Head yellowish with broad, dark brown median band; abdomen ventrally with segments marked narrowly in pale ochreous; wings hyaline with faint brownish tinge along costa for entire length. Otherwise as in male. Length of body ♂, 10 mm., ♀ 8 mm.; of fore-wing 10 mm.

Holotype— ♂, Ottawa, Ont., May 29, (J. McDunnough); No. 523, in the Canadian National Collection, Ottawa.

Allotype— ♀, same data, in the Canadian National Collection, Ottawa.

Siphlonurus berenice sp. nov.

Male. Head brownish, paler on the face; thorax dull brown with pale, clay-colored shading in medio-dorsal area. Abdomen brown dorsally with the usual pale triangular patches laterally, the last three segments more opaque and paler; ventrally pale brown, semi-transparent, except on last three segments, which are opaque and shaded with ochreous; forceps dull smoky in apical portion. Legs pale olive brown; fore-legs with the tarsal joints very long, subequal and tibia only slightly longer than first tarsal joint. Wings hyaline with dark veins, very slightly tinged with pale brown along apical portion of costa. Length of body 10 mm.; of fore-wing 10 mm.

Holotype— ♂, Cascades, Gatineau River, Quebec, June 13, (J. McDunnough); No. 524, in the Canadian National Collection, Ottawa.

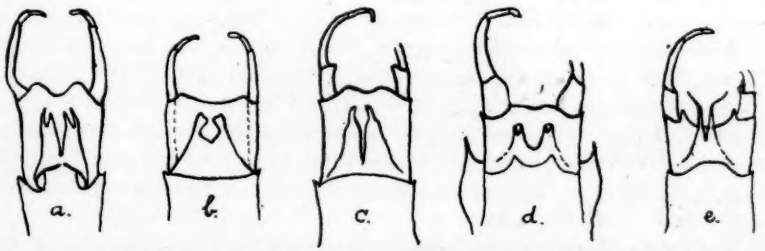

Fig. 3. Male genitalia of *a. Siphlonuroides croesus* McD.; *b. Siphlonuroides midas* McD.; *c. Siphlonurus berenice* McD.; *d. Siphlonurus phyllis* McD.; *e. Ameletus validus* McD.

Siphlonurus phyllis sp. nov.

Male. Head and thorax black brown, the latter shaded somewhat with yellowish anteriorly. Abdomen dark brown dorsally with the usual subdorsal dark streaks and a bifid patch of yellow laterally on the anterior margin of each segment, becoming more extended on posterior segments; ventrally yellowish, very characteristically marked with a brown median stripe flanked by a large brown dot on anterior portion of segment and a smaller dot in central portion

of segment, which generally touches the median stripe; some slight brown shading along spiracular flange, ninth segment largely pale yellow with a deep brown lateral streak and diffuse brown shading in median area, especially at base of segment, lateral edge produced to a prominent sharp tooth; ventral plate squarely truncate; forceps pale ochreous. Setæ whitish. Legs dull olive brown, femora banded with brown. Wings hyaline with dark veins and with very faint tinges of pale brown in basal area.

Female. Very similar in maculation to the male. Ventral prolongation of ninth abdominal segment small and evenly rounded; with the exception of segments eight and nine, the ventral area is considerably clouded with brown, but the maculation remains distinct. Length of body, ♂, 12 mm.; ♀, 13 mm.; of fore-wing ♂, 12 mm.; ♀, 14 mm.

Holotype—♂, Banff, Alta., July 26, (C. B. Garrett); No. 525, in the Canadian National Collection, Ottawa.

Allotype—♀, Banff, Alta., July 25, (C. B. Garrett); in the Canadian National Collection, Ottawa.

Ameletus validus sp. nov.

Male. Head discolored; thorax deep black-brown, shiny, tinged with light brown on anterior sutures of mesothorax and in the area adjacent to the posterior tubercles. Abdomen pinkish brown, the first six segments semi-transparent with narrowly opaque sutures; segments 7—10 opaque, segment 9 being shaded laterally with smoky brown; abdominal plate brown, with paler lateral edges and a light ochreous median area, posterior margin strongly excavated medianly with a small tooth on either side of the concavity; forceps smoky brown. Prolegs deep black brown, other legs similar in color to abdomen. Wings hyaline with dark veins, faintly clouded with light umber brown, palest along outer margin. Length of body 10 mm.; of fore-wing 11 mm.

Female. With more extended pale thoracic shading and no cloud on wings.

Holotype—♂, Banff, Alta., Oct. 1 (C. B. Garrett); No. 526, in the Canadian National Collection, Ottawa.

Allotype—♀, Banff, Alta., Sept. 20 (C. B. Garrett); in the Canadian National Collection, Ottawa.

Paratype—1 ♂, Banff, Alta., Sept. 30 (C. B. Garrett); in the Canadian National Collection, Ottawa.

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